

A New Variety of *Didymoplexis cornuta* (Orchidaceae) from West Kalimantan, Borneo

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A new variety of *Didymoplexis cornuta* J. J. Sm. var. *betungkerihunensis* Tsukaya & H. Okada (Orchidaceae), found during a botanical survey of Betung Kerihun National Park, West Kalimantan, Borneo, Indonesia, is described and illustrated. This collection resembles *D. cornuta* J. J. Sm. in having lateral sepals, connate except for the very tip, which is known only from Bogor, Java, Indonesia. Overall colouration also resembles *D. cornuta*. However, the proposed new variety differs in flower size, has a shorter spur, and lacks a spine-like appendage on the claw near the base of the lip.

Key words: Borneo, *Didymoplexis cornuta* var. *betungkerihunensis*, Kalimantan, mycoheterotrophic plant, new variety, Orchidaceae

The genus *Didymoplexis* Griff. in the family Orchidaceae consists of ca. 20 mycoheterotrophic species (Wood & Cribb 1994), closely related to the genus *Didymoplexiella* Garay, consisting of eight species (Tsukaya *et al.* 2005). In Borneo, three species, *Didymoplexis pallens* Griff., *D. latilabris* Schltr. and *D. striata* J. J. Sm., are known. *D. pallens* is the most widely distributed species in this genus (found from India, Malaysia, Indonesia, Philippines to Australia), and has white lateral sepals connate in the basal half with round tips; *D. latilabris* is endemic to Borneo, and has a flower similar to *D. pallens*, with round apices of sepals; and *D. striata* is known from Java and Borneo, and has conspicuous warts on the abaxial surface of pale brown sepals (Comber 1990, Schulechter 1906, Smith 1903, Wood & Cribb 1994).

The trans-border area of Borneo between Indonesia, Malaysia and Brunei, known as the “Heart of Borneo”, has a rich biodiversity, particularly in the tropical rain forests. Recently, we discovered some interesting new species of sap-

rophytic/mycoheterotrophic plants in the Kalimantan area of the Heart of Borneo (Tsukaya & Okada 2005, in press, Tsukaya *et al.* 2005, 2011), during botanical expeditions planned by the Research Center for Biology – Indonesian Institute of Sciences (LIPI). We also discovered a new species of Orchidaceae (Vermeulen & Tsukaya 2011) there. During a botanical expedition in Betung Kerihun National Park, West Kalimantan, conducted from December 2010 to January 2011, we found a species of *Didymoplexis* (Fig. 1) on 27 December 2010. These plants had a flower with connate lateral sepals, a dorsal sepal and lateral petals adnate up to halfway, indicating that this species belongs to the genus *Didymoplexis* or genus *Didymoplexiella*. Since long decurved stelidia in the column, a key character of the genus *Didymoplexiella*, were lacked, this species are judged to belong to the genus *Didymoplexis*. Here we describe this as a previously unrecognized variety of *D. cornuta* J. J. Sm. (Smith 1925), which was previously only known from Java (Comber 1990).

Materials and Methods

Flower structure

Specimens were kept in 50% (v/v) ethanol, and the structure of the flower was observed under a stereomicroscope. Anatomical figures were drawn by Ms. Mutsuko Nakajima, using a microscope equipped with a camera lucida.

Results

The *Didymoplexis* plants collected from Betung Kerihun National Park, West Kalimantan, had purplish brown stems, a brown tuber with a blush of orange, pale yellow roots with hint of orange, and a flower with white sepals and petals (Fig. 1). Close up, the abaxial side of the sepals and petals is white flushed with purplish brown; the adaxial side is pure purple. The lip has three yellow, longitudinal ridges (Fig. 1). Lateral sepals are entirely connate, except for the very tip, and a dorsal sepal and lateral petals are connate up to one-third in length (Fig. 2A, C), showing very close similarity to *D. cornuta* reported from Java (Smith 1925). Overall colouration and lanceolate dorsal sepal and lateral petals also resemble *D. cornuta*. *Didymoplexis cornuta* also has orange roots, a tuber-like rhizome, white flushed with violet abaxial surfaces of flowers, lateral sepals heavily jointed except for very small triangular tips, a dorsal sepal with a lanceolate-free part, pale yellow lip with three raised ridges and faintly tri-lobed tip (Smith 1925, Comber 1990); all of these characters are shared with our new specimen (Figs. 1, 2). No *Didymoplexis* species resembles this specimen other than *D. cornuta* in terms of the above characters. For example, three known species from Borneo, *D. pallens*, *D. latilabris* and *D. striata* (Wood & Cribb 1994), differ completely in having round, wide, free lateral sepals or warts on the abaxial surface of sepals. Although the collected specimen had warts on the abaxial surface of sepals and lateral petals (Fig. 1B), these warts are not as conspicuous as in *D. striata*; the collected specimen does not share the other characters with *D. striata*, such as a joint

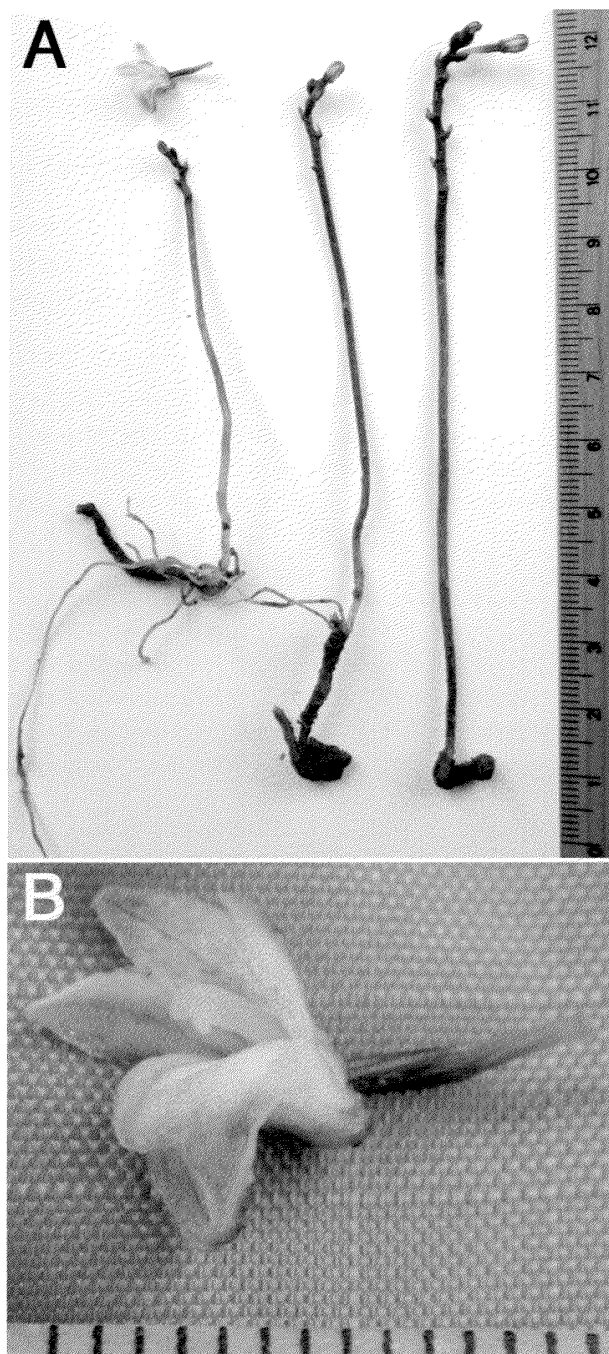


FIG. 1. *Didymoplexis cornuta* var. *betungkerihunensis* Tsukaya & H. Okada. A: Gross morphology of the plant. Three individuals are shown. B: A close-up of a flower. Scale for A, 1 cm, and B, 1 mm. All pictures were drawn from the type specimen by Hirokazu Tsukaya.

between lateral petals and a dorsal sepal for two-thirds of the length, winged apex of the column, or pale brown sepals (Smith 1903, Comber 1990).

We undertook detailed and careful examination of the flowers of the new specimen, and compared them to those of *Didymoplexis cornuta*. *D.*

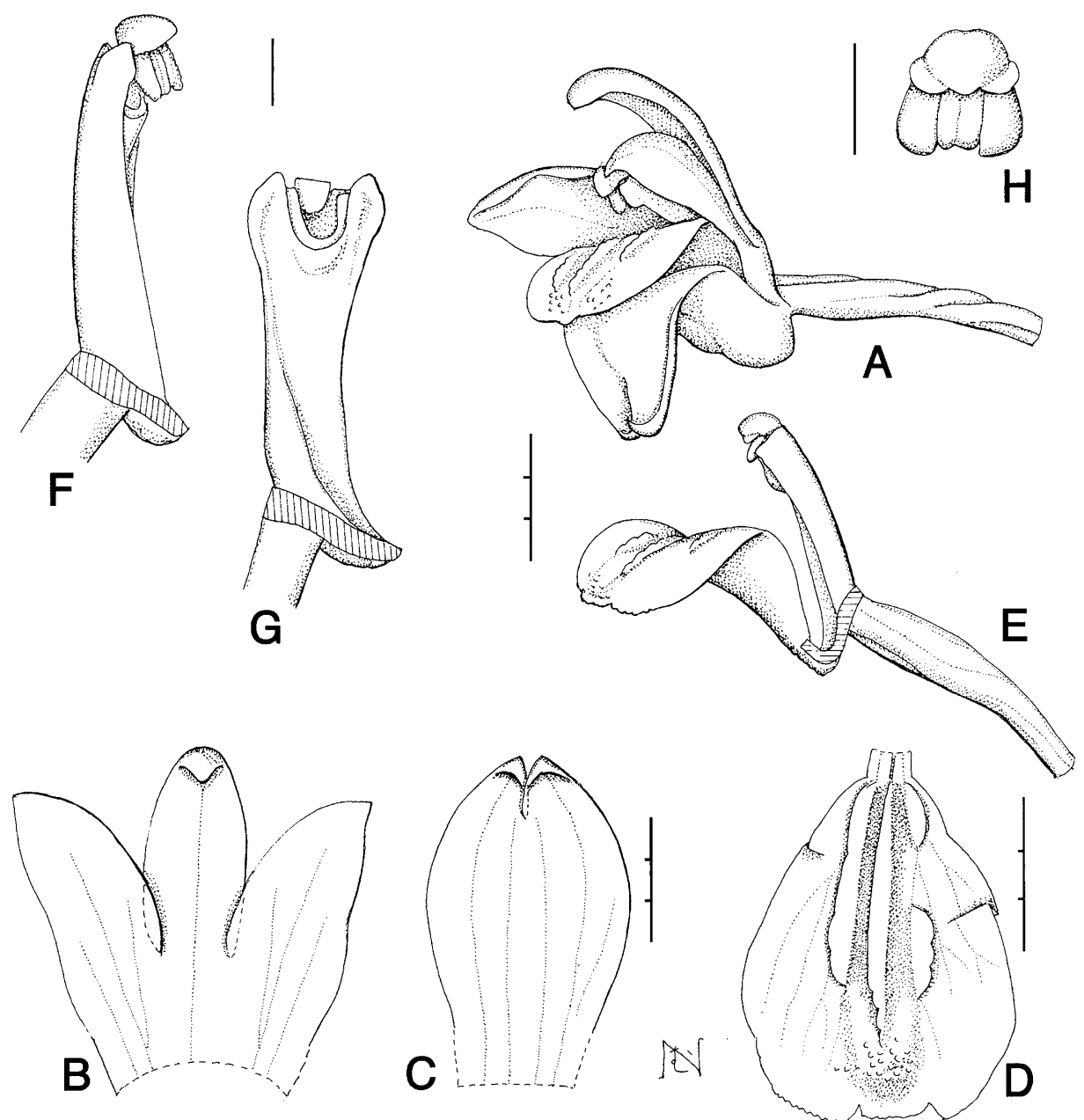


FIG. 2. *Didymoplexis cornuta* var. *betungerihunensis* Tsukaya & H. Okada. A: Flower, lateral view. B: Connate dorsal sepal and lateral petals. C: Connate lateral sepals. D: Lip. E: Lateral view of lip and column with anther. Note absence of horn-like appendage at the base of the claw. F: Column, lateral view. G: Column, ventral view. H: Anther. Scale, 1 mm. Drawn from the type specimen by Mutsuko Nakajima.

cornuta flowers are 0.7 cm in diameter (Smith 1925), i.e., 8 mm wide by 11.5 mm long (Comber 1990), which is similar to the collected flower (ca. 7 mm in diameter: Figs. 1, 2). But the size of the lip is much smaller in our specimen (5 mm long and 4.5 mm wide; Fig. 2D) than in *D. cornuta* (ca.

9 mm long and 5.5 mm wide; Comber 1990). In morphology, we also found several differences. First, while *D. cornuta* has a unique character in the lip, having a small, horn-like appendage at the base of the claw from which the species name is derived, the collected sample does not have such

an appendage (Fig. 2E). Second, the apical margin of the lip of *D. cornuta* is deeply toothed, while our specimen has a rather shallow, inconspicuous tooth (Fig. 2D). Third, possibly due to the small stature of the collected sample, the spur was not as obvious as that of *D. cornuta* (Fig. 2A, E). Fourth, while *D. cornuta* has a smooth abaxial surface of the dorsal and lateral sepals, the collected specimen has a somewhat warty surface (Fig. 1B). In summary, the new specimen appears to be very closely related to *D. cornuta* but differs in some characters.

Discussion

To date, three species of the genus *Didymplexis* have been discovered in Borneo, but no report is available for *D. cornuta*, which is thought to be endemic to Bogor, West Java. The specimen described in this study is morphologically very similar to *D. cornuta*, but has some different morphological characters in the lip and a different flower size. Considering the small but obvious differences in morphology and remote distribution between *D. cornuta* and our specimen, we herein describe the collected specimen as a new variety of *D. cornuta*, namely, *D. cornuta* var. *betungkerihunensis*.

A key to the species of *Didymplexis* in Borneo

- 1a. Abaxial surface of dorsal sepal conspicuous with warts.....2
- 1b. Abaxial surface of dorsal sepal smooth. 3
- 2a. Lateral petals and a dorsal sepal adnate for two-thirds of the length, apex of the column winged, sepals pale brown*Didymplexis striata* J. J. Sm.
- 2b. Lateral petals and a dorsal sepal adnate for one-third of the length, apex of the column clavate, sepals white with purple***D. cornuta*** J. J. Sm. var. ***betungkerihunensis*** Tsukaya & H. Okada
- 3a. Dorsal sepal 4.0–4.5 mm long. *D. pallens* Griff.
- 3b. Dorsal sepal 6 mm long.....*D. latilabris* Schltr.

Taxonomic treatment

Didymplexis cornuta J. J. Sm.

var. ***betungkerihunensis*** Tsukaya & H. Okada,
var. nov.—Figs. 1, 2.

A typo labello appendicibus in unguiculis prope basin absentibus (in typo appendicibus spiniformibus), margine prope apicem indistincte minute denticulato (in typo distincte denticulato) differt.

Type. INDONESIA, West Kalimantan: Betung Kerihun National Park, along Sungai (River) Tobong Kopang, ca. 203 m altitude, 00°54'48.0"N, 113°40'22.6"E (holotype), under tropical rain forest (lower hill forest), mainly composed of Dipterocarpaceae, 27 December 2010, H. Okada, H. Nagamasu & H. Tsukaya HT1011A (BO, dried specimens, with a flower specimen preserved in 50% ethanol).

Terrestrial, achlorophyllous herb, mycotrophic. Rhizome 0.5–2.5 cm long, 1.6–2.0 mm in

diameter, brown flushed with orange, tuber-like. Roots 2–5, arising from the junction between the stem and the rhizome, white flushed with orange-yellow. Stems erect, simple, dark purple, darker at the apex and paler in the basal parts, underground part sometimes yellowish white, bearing ± 10 flowers, 10–12 cm long. Bracts minute, triangular, acuminate, ca. 2 mm long, dark purple, turning brown at maturity in the membranous margin. Pedicellate ovary short, 5 mm long, brownish purple, paler at the base. Flowers white blushed with purple on the abaxial surface, in particular along the midvein of each perianth lobe, 7 mm long, 9 mm across. Lateral sepals connate for almost the whole length, except for the tip of ca. 1 mm long, the free tip acute, white; the abaxial surface blushed with purple and slightly warty. Dorsal sepal and lateral petals ca.

8 mm long, connate at base for about one-third of the length, forming a loose hood over the column, the free part three-lobed, each lanceolate, white, abaxial surface blushed with purple, slightly warty, ca. 2.0–2.5 mm wide. Lip white with three longitudinal yellow, raised, callus-like ridges; triangular, truncate in front, with very shallow tooth at the very faintly tri-lobed front margin, 5 mm long, 4.5 mm wide. Spur very short, ca. 0.8 mm long. A small, horn-like appendage at the base of the adaxial side of the claw of the lip, which is a key character of *D. cornuta* var. *cornuta*, is absent. Column white, clavate, slightly twisted, with a slightly wide apex, 6 mm long, with a short foot at the base, 1 mm long. Pollinia four. Anther cap white, 0.6 mm wide. Fruit not seen.

Additional specimen examined. INDONESIA, West Kalimantan: Betung Kerihun National Park, along Sungai (River) Tobong Kopang, ca. 259 m altitude, 00° 54'54.2"N, 113°40'19.0"E, under tropical rain forest (lower hill forest), mainly composed of Dipterocarpaceae, 27 December 2010, H. Okada, H. Nagamasu, & H. Tsukaya HT1011B (TI, dried specimen).

Note. We collected this variety in two localities, both of which were very near to a small stream, 2–3 m from the shoreline. Areas around the type locality are rich in mycoheterotroph species, such as one Thismiaceae (one new species of *Thismia*: Tsukaya & Okada, in press), four Burmanniaceae (one species of *Gymnosiphon* and three of *Burmannia*), two Polygalaceae (two *Epirixanthes*), two Triuridaceae (two *Schiaphila*) and seven Orchidaceae (including this species, three *Lecanorchis*, one *Tropidia*, etc.) species. We found *Cystrochis* sp. (Orchidaceae) cohabitating with this new variety in one locality from where the holotype individual was collected.

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